U.S. Department
of Transportation

Federal Aviation
Administration

Advisory Circular

Subject. DEVELOPMENT OF STATE STANDARDS FOR NONPRIMARY AIRPORTS

Date: 9/28/99
Initiated by: AAS-200

AC No.: 150/5100-13A
Change:

1. **PURPOSE.** This advisory circular (AC) provides guidelines for the development of state standards for nonprimary public-use airports as provided for in Title 49 United States Code, Section 47105 (c).

2. **CANCELLATION.** AC 150/5100-13, *Development of State Standards for General Aviation Airports*, dated March 1, 1977, is cancelled.

3. **SCOPE.** This advisory circular contains guidelines for the development of state standards other than standards for safety of approaches. Upon approval by the Federal Aviation Administration (FAA), such standards will be applicable in lieu of any comparable Federal standards.

4. **APPLICATION.** The FAA recommends the use of the guidance in this publication for the preparation of design standards and specifications for pavement construction at nonprimary public-use airports for those airports using Federal grant-in-aid assistance in the funding of those projects.

5. **RELATED READING MATERIAL.** The following FAA advisory circulars may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

a. AC 150/5000-3, Address List for Regional Airports Divisions and Airports District Offices

b. AC 150/5320-6, Airport Pavement Design and Evaluation.

c. AC 150/5300-13, Airport Design Standards

d. AC 150/5320-5, Airport Drainage.

e. AC 150/5370-10, Standards for Specifying Construction of Airports.

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1. GENERAL. This advisory circular (AC) provides guidelines for the development of state standards for nonprimary public-use airports as provided for in Title 49 United States Code, Section 47105 (c). The AC includes guidance for incorporating State highway specifications into state standards. The Federal Aviation Administration (FAA) may approve such standards, and upon approval, such standards will be applicable in lieu of any comparable FAA standards.

2. FEDERAL PARTICIPATION. The administration of a federal grant for the purpose of developing state standards may be conducted under the prevailing legislation of the Airport Improvement Program or derivatives thereof.

3. DEFINITIONS.

a. "Airport" means an area of land or water used or intended to be used for the landing and taking off of aircraft and includes a heliport.

b. "Public-use airport" means a public airport; or a privately-owned airport used or intended to be used for public purposes.

c. "Primary airport" means a commercial service airport that has more than 10,000 passenger boardings each year.

d. "Commercial service airport" means a public airport in a State that has at least 2,500 passenger boardings each year and is receiving scheduled passenger aircraft service.

e. "Passenger boardings" means revenue passenger boardings on an aircraft in service in air commerce; and includes passengers who continue on an aircraft in international flight that stops at an airport in the 48 contiguous States, Alaska, or Hawaii for a nontraffic purpose.

f. "Nonprimary airport" includes, for the purpose of this advisory circular, all civil airports with 10,000 passenger boardings or less each year.

g. "General aviation airport" is, for the purpose of this advisory circular, a civil airport not designated as a commercial service airport.

h. "Public airport" means an airport used or intended to be used for public purposes that is under the control of a public agency; and of which the area used or intended to be used for the landing, taking off, or surface maneuvering of aircraft is publicly owned.

i. "Public agency" means a State or political subdivision of a State; a tax-supported organization; or an Indian tribe or pueblo.

j. "State" means a State of the United States, the District of Columbia, Puerto Rico, the Virgin Islands, American Samoa, the Northern Mariana Islands, the Trust Territory of the Pacific Islands, and Guam.

4. AFFECTED STANDARDS. Standards for airport design at nonprimary public-use airports, other than standards for safety of approaches, are appropriate for consideration. These include standards for the configuration, design, and construction of airport pavements.

a. Configuration Standards. These standards relate primarily to the length, width, separation, and clearances of airport runways, taxiways, and aprons. Ranges for FAA dimensional standards applicable to general aviation airports are contained in Advisory Circular 150/5300-13, Airport Design, and should be used as guidance in this area. FAA configuration standards have been developed over a period of years and present minimum acceptable values insuring safe operations, taking into consideration the capabilities of pilots and types of aircraft expected to use an airport, as well as variable local climatic and visibility conditions. They also insure that exemptions to standard terminal instrument procedures will not be required.

b. Design Standards. Design standards relate to the design of airport pavements and drainage systems.

(1) Pavement Design. FAA standards for airport pavement structural design are contained in Advisory Circular 150/5320-6, Airport Pavement Design and Evaluation, and should be used as guidance in developing state standards. Development of pavement thickness curves contained in this document was based on theoretical analysis of load distribution, analysis of experimental data, and studies of pavement performance under actual service conditions. Pavements constructed in accordance with these standards are intended to provide a pavement life of 20 years and have generally proven satisfactory. State standards developed for pavement design should consider the following factors:

(a) Maximum gross weight of aircraft.

(b) Gear type and configuration.

(c) Traffic volume and distribution.

(d) Strength of subgrade soil.

All design methods must be supported by adequate documentation. An acceptable method to develop pavement designs for nonprimary public-use airports serving aircraft of 60,000 pounds gross weight and under using the American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement Structures, 1993, is presented in the Appendix 1. Pavement designs using the parameters contained in Appendix 1 are considered comparable to FAA standard pavement designs.

(2) Drainage Design. FAA guidance for drainage systems is contained in Advisory Circular 150/5320-5, Airport Drainage. State highway department standards are generally adequate for general aviation airport construction and may be adopted as state standards. However, it is critical that design of drainage structures be adequate for all anticipated aircraft loads prior to incorporation as standards for airport construction.

a. Construction Standards. Construction standards relate primarily to materials and methods employed in the construction of airport improvements and are used in the preparation of contract specifications.

(1) FAA Standards. These standards are contained in Advisory Circular 150/5370-10, Standards for Specifying Construction of Airports, are general in scope, and serve as a guide to develop specifications for specific projects. It is recommended that the format, language, and options of these standards be used to the maximum extent possible in developing state standards and that modifications and changes be made if necessary to adjust to local conditions, policies, or available materials.

(2) State Highway Specifications. State highway specifications have been developed specifically for use in construction of roads and highways using design considerations different from those developed for airport pavement. Highway specifications should be adopted as standards for airport construction only if the performance record under equivalent loadings and exposure has been satisfactory. Airport pavements constructed at nonprimary public-use airports serving aircraft of 60,000 pounds gross weight or less using State highway specifications fall within one of the following design conditions:

(i) Pavements serving aircraft with gross weights of 12,500 pounds and under;

(ii) Pavements serving aircraft with gross weights of 30,000 pounds and under; and

(iii) Pavements serving aircraft with gross weights of 60,000 pounds and under.

The pavement structural sections to be employed when state highway construction specifications are used are presented in Appendix 1. They are considered comparable to FAA standard pavement structural sections. For pavements which will receive substantial use by aircraft exceeding 60,000 pounds gross weight or with tire pressures greater than 100 psi, FAA standards should be adopted since they have been used successfully for many years on airports serving this type of aircraft and have been validated by extensive research.

5. EXCLUDED STANDARDS. Excluded for consideration is the development of standards which relate to safety of airport approaches. FAA standards, based on operational experience, must be used in this area. They provide guidance to pilots intending to land at an airport and are considered minimum standards for conducting safe approaches during daylight operations, nighttime operations, or periods of reduced visibility. Typical excluded items include:

a. Runway and taxiway lighting configurations.

b. Runway and taxiway markings.

c. Visual aids.

d. Approach surface, size, and slope.

e. Obstruction removal and protection.

6. FAA APPROVAL OF STANDARDS. An application for use of state standards may be submitted to an appropriate FAA Airports District or Regional office by a State for standards effecting one or more airports in the State if the following conditions are met.

a. The sponsor of each airport gives written consent that the State may act as the sole applicant;

b. The FAA is satisfied there is administrative merit and aeronautical benefit in the State being the sponsor, and

c. The State has obtained acceptable assurances or certifications that each affected airport has implemented an effective airport pavement maintenance-management program.

On completion of the application for the use of state standards, the State should submit three copies of a final report in draft form to the appropriate FAA Airports District or Regional office. The report shall contain relevant state standards and include the rationale used to establish these standards. The FAA will review the report and submit comments in writing to the State. If the FAA takes exception to certain portions of the application, they will suggest the State modify the standards accordingly. Upon resolution of problem areas five copies of the final report shall be submitted to the FAA Airports office. Upon approval, the state standards may apply to projects at nonprimary public-use airports in that State, in lieu of comparable Federal standards.

7. REVISION OF STATE STANDARDS. The state may submit revisions to approved state standards when deemed necessary. Revision of standards will also be subject to the FAA approval process.

8. AVAILABILITY OF APPROVED STATE STANDARDS FOR PAVEMENTS. Upon approval, the FAA may place all information related to the approval of state standards for pavements on its world wide web home page.

Appendix 1 contains information that will be employed when state highway specifications form the basis for development of state standards for pavement design and construction. A recommended format and content for proposals to use state highway specifications for construction of non primary airports in lieu of FAA specifications is presented in Appendix 2.

APPENDIX 1

RECOMMENDED PAVEMENT DESIGN STRUCTURAL SECTIONS WHEN STATE HIGHWAY CONSTRUCTION SPECIFICATIONS ARE USED

1. PURPOSE. This appendix presents three methods for developing pavement design structural sections for use at nonprimary public-use airports serving aircraft with gross weights of 60,000 pounds or less when State highway specifications are employed in lieu of Federal Aviation Administration (FAA) construction specifications. The information in this appendix focuses on airside pavement for aircraft loadings. Designs should also consider the pavement section required to support the weight of maintenance and fueling equipment.

2. REFERENCES. The publications listed below provide further guidance and detailed information on the design of pavements.

a. AC 150/5320-6, Airport Pavement Design and Evaluation.

b. AASHTO Guide for Design of Pavement Structures, 1993.

3. METHOD A. MINIMUM THICKNESS FOR PAVEMENT STRUCTURAL SECTIONS. The pavement structural sections that are considered equivalent to FAA standard pavement structural sections when state highway materials and specifications are described in Table A1-1. Unless indicated otherwise, the pavement design is based on the FAA standard pavement design procedure. The density and compaction requirements should be the highest specifiable value in the State specification book that is comparable to FAA materials.

TABLE A1-1. MINIMUM PAVEMENT STRUCTURAL SECTIONS

Aircraft Gross Weight Category	Recommended State Standard Equivalent Pavement Sections When Using State Highway Materials and Specifications.	
	Asphaltic Concrete (AC) Pavements	Portland Cement Concrete (PCC) Pavements
12,500 and Under	AC = FAA design thickness+1/4" 50-blow Marshall equivalent	5" PCC Minimum cement content of 564#/CY
	Base = FAA design thickness+1"	4" Subbase
	Subbase = Thickness required to meet FAA design total thickness.	
30,000 and Under	AC = FAA design thickness+1/2" 50-blow Marshall equivalent	6" PCC Minimum cement content of 564#/CY
	Base = FAA design thickness+1"	4" Subbase
	Subbase = Thickness required to meet FAA design total thickness.	
60,000 and Under	50-blow Marshall equivalent when tire pressure less than 100 psi. AC = FAA thickness+1" 75-blow Marshall equivalent when tire pressure more than 100 psi. AC = FAA thickness+1/2"	FAA Design thickness based on 600 psi flexural strength. Minimum cement content of 564#/CY
	Base = FAA design thickness+2"	4" Subbase
	Subbase = Thickness required to meet FAA design total thickness.	

4. METHOD B. AASHTO ALTERNATE FOR PAVEMENT STRUCTURAL SECTIONS. The recommended minimum AASHTO pavement structural numbers and pavement thickness values presented herein are an alternate method to satisfy the requirements for considering maximum gross weight of aircraft, gear type and configuration, traffic volume and distribution, and strength of subgrade soil. They have been developed using the AASHTO Guide for Design of Pavement Structures, 1993, in conjunction with AC 150/5320-6, Airport Pavement Design and Evaluation, and the minimum pavement structural sections given in Table A1-1. In all cases a crushed aggregate base course (Item P-209) was used in the FAA design procedure.

a. The recommended structural and drainage coefficients are listed in Table A1-2. All material and related properties were selected to be within the upper quality from the AASHTO recommendations.

TABLE A1-2. AASHTO MATERIAL LIBRARY CONSTANTS FOR NONPRIMARY AIRPORTS

Material Description	Structural Coefficient	Drainage Coefficient
Asphaltic Concrete (AC)	0.44	1.0
Crushed Aggregate Base	0.14	1.0
Aggregate Subbase	0.11	0.9

b. Strength of Subgrade Soil. The subgrade strength parameters for flexible and rigid pavements have been related to the AASHTO equivalent Roadbed Soil Resilient Modulus (psi), M_R as follows:

(1) Flexible Pavements. The California Bearing Ratio (CBR) has been converted to:

$$M_R = 1500 \times CBR$$ (Valid for CBR values ranging from 3 through 20.)

(2) Rigid Pavements. The modulus of subgrade reaction subgrade (k) is equal to the AASHTO equivalent Effective Modulus of Subgrade Reaction (k).

c. Additional Design Considerations for Flexible and Jointed Rigid Pavements. The additional inputs required in the AASHTO guide method for flexible and jointed rigid pavements used to determine the recommended minimum pavement structural number are as follows:

TABLE A1-3. AASHTO DESIGN INPUT VALUES FOR FLEXIBLE AND JOINTED RIGID PAVEMENTS

Design Factor	Value	
	Flexible Pavement	Rigid Pavement
Initial Serviceability:	4.2	---
Terminal Serviceability:	3.5	---
Reliability Level (%):	90	---
Overall Standard Deviation:	0.44	---
28-day mean PCC Modulus of Rupture (psi):		600
Elastic Modulus of Asphaltic Concrete (psi)	400,000	---
Resilient Modulus of Crushed Aggregate Base (psi)	30,000	---
Resilient Modulus of Aggregate Subbase (psi)	15,000	---
Roadbed Soil Resilient Modulus (psi)	1500 x CBR	---
Effective Modulus of Subgrade Reaction (k)		AASHTO method

d. Minimum Structural Number--Flexible Pavements. Table A1-4 shows the recommended minimum structural numbers when using the AASHTO Design Guide for flexible pavements. The values were derived by calculating a structural number using the layer thickness values given in Table A1-1, the material constants listed in Table A1-2, the strength of subgrade soil determined in accordance with the guidance given in paragraph 4b, and the design input values listed in Table A1-3. Under METHOD B, the designer can use the FAA recommended minimum structural number in conjunction with State approved AASHTO parameters to develop a variety of possible thickness designs based on the AASHTO Design Guide options that still meet FAA assumptions.

TABLE A1-4. MINIMUM AASHTO STRUCTURAL NUMBERS, FLEXIBLE PAVEMENT DESIGN

FAA CBR	AASHTO Subgrade M_R	Structural Number (minimum)			
		12,500 and Under	30,000 and Under	60,000 and Under 1,200 Annual Departures	60,000 and Under 3,000 Annual Departures
3	4,500	2.51	3.60	4.93	5.13
4	6,000	2.29	3.19	4.49	4.63
5	7,500	2.14	2.88	4.14	4.34
6	9,000	2.03	2.66	3.94	4.09
7	10,500	1.91	2.53	3.74	3.89
8	12,000	1.82	2.43	3.60	3.74
9	13,500	1.75	2.34	3.50	3.60
10	15,000	1.69	2.21	3.35	3.50
11	16,500	1.63	2.16	3.30	3.40
12	18,000	1.58	2.12	3.20	3.30
13	19,500	1.55	2.08	3.15	3.20
14	21,000	1.55	2.05	3.10	3.15
15	22,500	1.55	2.05	3.10	3.10
16	24,000	1.55	2.05	3.10	3.10
17	25,500	1.55	2.05	3.10	3.10
18	27,000	1.55	2.05	3.10	3.10
19	28,500	1.55	2.05	3.10	3.10
20	30,000	1.55	2.05	3.10	3.10
20+	30,000+	1.55	2.05	3.10	3.10

e. Minimum Thickness Design--Rigid Pavements. The recommended thickness values for rigid pavements were derived using the FAA rigid pavement design procedures for 600 psi. flexural strength concrete. The modulus of subgrade reaction values used were derived using the AASHTO equivalent effective modulus of subgrade reaction (k). The effective modulus of subgrade reaction was calculated using the layer information listed in Table A1-5, and the soil resilient modulus. Table A1-6 shows the recommended minimum pavement thickness for rigid pavements.

TABLE A1-5. LAYER INFORMATION FOR JOINTED RIGID PAVEMENTS

Layer Information	Value
Base type	unbound
Base Thickness (in)	4
Depth to bedrock (ft)	25
Projected slab thickness (in)	8
Loss of support	1

TABLE A1-6. MINIMUM PAVEMENT THICKNESS RIGID PAVEMENT DESIGN, 600 psi. STRENGTH

Subgrade M_R	Effective Modulus of Subgrade Reaction (k) (see Table A1-4)	Recommended Minimum Portland Cement Concrete Thickness (in.)			
		12,500 and Under	30,000 and Under	60,000 and Under 1,200 Annual Departures	60,000 and Under 3,000 Annual Departures
4,500	85	5.0	6.0	10.0	10.5
6,000	105	5.0	6.0	10.0	10.5
7,500	124	5.0	6.0	9.5	10.0
9,000	142	5.0	6.0	9.5	10.0
10,500	159	5.0	6.0	9.5	10.0
12,000	175	5.0	6.0	9.5	10.0
13,500	191	5.0	6.0	9.0	10.0
15,000	207	5.0	6.0	9.0	9.5
16,500	222	5.0	6.0	9.0	9.5
18,000	237	5.0	6.0	9.0	9.5
19,500	251	5.0	6.0	9.0	9.5
21,000	266	5.0	6.0	9.0	9.5
22,500	280	5.0	6.0	9.0	9.5
24,000	293	5.0	6.0	9.0	9.5
25,500	307	5.0	6.0	9.0	9.5
27,000	320	5.0	6.0	8.5	9.0
28,500	333	5.0	6.0	8.5	9.0
30,000	346	5.0	6.0	8.5	9.0
30,000+	346	5.0	6.0	8.5	9.0

5. METHOD C. When Method A or B do not provide a suitable means for a State to develop pavement structural designs for nonprimary public-use airports in the State, a detailed submittal of the method proposed is required.

APPENDIX 2

RECOMMENDED FORMAT AND CONTENT FOR STATE STANDARDS REPORTS WHEN STATE HIGHWAY SPECIFICATIONS ARE PROPOSED

1. PURPOSE. This appendix presents information to facilitate an FAA review of a state's proposed use of standard State Highway Specifications, or portions thereof, in lieu of FAA standard specifications as contained in AC 150/5370-10, Standards for Specifying Construction of Airports.

2. STATE STANDARDS APPROVAL PROCESS. The approval process to use state standards for the construction of nonprimary public-use commercial service airports shall be as follows:

a. Each state must apply for approval to use its state highway construction standards for FAA funded pavement projects to the appropriate FAA Airport District Office or Regional Office.

b. No special forms are required. The request for approval must contain the information listed below. An example of an approval submission is shown in Table A2-1.

(1) The pavement section (thickness, material, and compaction requirements) proposed for use for each pavement course for pavements intended to serve all weight ranges under consideration. The proposed pavement sections must be related to one of the methods presented in Appendix 1 to this AC.

(2) Quality control and quality acceptance plans, if different from FAA requirements, must also be submitted for approval.

(3) Method of measurement for each material must be submitted for approval.

(4) Basis for payment for each material must be submitted for approval. The basis of payment must also include pay factor schedules, if part of the specification.

c FAA headquarters, AAS-1 (or designee), shall be the coordinating office for approval of state standards. The appropriate FAA Regional Office shall submit requests to AAS-1 (or designee) with their recommendations. Notification of approval shall be furnished by the appropriate FAA headquarters office to the appropriate FAA Regional Office. The regional office shall notify the airports district office, or the sponsoring state, as appropriate.

d The FAA shall maintain a listing of approved state standards on the FAA Airports web page, www.faa.gov/arp/arphome

e Revisions to state standards must be submitted to the FAA for approval.

TABLE A2-1. EXAMPLE SUBMISSION. INFORMATION FOR APPROVAL OF STATE HIGHWAY SPECIFICATIONS

FAA Specification Item	Specific State Highway Specification Reference Section or Paragraph				
	Materials	Mixture Composition	Density or Strength Requirements	Acceptance Criteria	Basis of Payment (Include Pay Adjustment Schedule)
Item P-401 Plant Mix Bituminous Pavements					
Item P-501 Portland Cement Concrete Pavements					
Item P-209 Crushed Aggregate Base Course					
Item P-208 Aggregate Base Course					
Item P-154 Subbase Course					
Item P-152 Excavation and Embankment					

Notes:
1. If the FAA Standard is desired insert "FAA Standard".
2. If a column is not applicable to the specification, insert "N.A."